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A.D. 1857 . . . . . N° 1232.

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S P E C I F I C A T I O N

OF

ALFRED A. BLANDY.

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MOULDING AND CASTING THE PLATES  
OR BASES OF ARTIFICIAL TEETH.

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L O N D O N :

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A.D. 1857 . . . . . N° 1232.

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**Moulding and Casting the Plates or Bases of  
Artificial Teeth.**

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**LETTERS PATENT** to Alfred A. Blandy, M.D., D.D.S., of the City and County of Baltimore, and State of Maryland, in the United States of America, for the Invention of “**AN IMPROVED MODE OF MOULDING AND CASTING THE PLATES OR BASES OF ARTIFICIAL TEETH.**”

Sealed the 27th October 1857, and dated the 1st May 1857.

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**PROVISIONAL SPECIFICATION** left by the said Alfred A. Blandy at the Office of the Commissioners of Patents, with his Petition, on the 1st May 1857.

I, ALFRED A. BLANDY, M.D., D.D.S., of the City and County of Baltimore,  
5 and State of Maryland, in the United States of America, do hereby declare  
the nature of the said Invention for “**AN IMPROVED MODE OF MOULDING AND  
CASTING THE PLATES OR BASES OF ARTIFICIAL TEETH,**” to be as follows :—

This Invention relates, firstly, to a peculiar process of moulding the plate  
or base of the teeth, by which a correct articulation can be had upon  
10 casting.

Secondly, to the use of an alloy suitable from its chemical and physical  
properties to form the plate or base of artificial teeth that will not practically  
shrink or expand in cooling or solidifying after being cast, whereby an accurate  
fit of the plate to the gums can be had.



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*Blandy's Improved Mode of Moulding & Casting the Plates of Artificial Teeth.*

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And, thirdly, to the use of a matrix, which, from the nature of its component parts, will not shrink or expand on being heated or cooled.

To illustrate the moulding process, let it be supposed that a case of teeth for the upper jaw is required. An "impression" of the upper jaw is first taken in wax, and recast to form the upper half of the matrix. Upon this cast a thin 5 plate of metallic foil coated with wax is pressed down in a careful manner to represent the plate or base of the teeth, after which a rim of wax of about one quarter of an inch thick is fitted upon it to represent the teeth; the plate and rim thus prepared are then removed from the model and inserted in the mouth of the patient to obtain the just acclusion or bite, by cutting down or 10 trimming the rim of wax, as circumstances may require.

When properly trimmed the plate is removed from the mouth, and the teeth requisite to supply the want are then carefully fitted upon the wax rim, after which the redundant wax is removed. The plate and rim thus armed with the teeth are placed upon the model or upper half of the matrix ready 15 to receive the composition which is to form the lower flask of the matrix. The latter when solidified and sufficiently hardened may be removed from the upper flask, carrying with it the plate, the rim of wax, and the teeth which are imbedded in it. The wax and foil may now be carefully removed and withdrawn from around the teeth and the lower flask. A gate or aperture is 20 then cut in the flask to permit a free influx of the metal to form the plate of the teeth and to allow the air and gas to escape. The two flasks are now brought together and firmly secured by means of wire. The mould thus formed is heated, and the molten metal may be poured into it with perfect safety to the teeth. To prevent the shrinking or expansion of the matrix the 25 following composition is used, viz., equal parts or nearly so of feldspar and plaster of Paris thoroughly incorporated with each other.

The metallic alloy used for forming the plate is composed of bismuth and antimony combined, either singly or together with tin, cadmium, and silver in suitable proportions.

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The expansive properties of the antimony and bismuth on cooling are intended to neutralize the shrinkage on the part of the other metals. They also serve in conjunction with the silver and cadmium, to give that hardness, strength, and rigidity to the alloy necessary to render it suitable to form the dental plate. The plate when completed, if desired, may be readily and durably 35 coated with pure gold.

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**SPECIFICATION** in pursuance of the conditions of the Letters Patent, filed by the said Alfred A. Blandy in the Great Seal Patent Office on the 29th October 1857.

**TO ALL TO WHOM THESE PRESENTS SHALL COME**, I, ALFRED  
5 A. BLANDY, M.D., D.D.S., of the City & County of Baltimore, State of Maryland, in the United States of America, send greeting.

**WHEREAS** Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the First day of May, A.D. 1857 in the twentieth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto  
10 me, the said Alfred A. Blandy, Her special license that I, the said Alfred A. Blandy, my executors, administrators, or assigns, or such others as I, the said Alfred A. Blandy, my executors, administrators, or assigns, should at any time agree with, and no others, from time to time and at all times there-  
after during the term therein expressed, should and lawfully might make,  
15 use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for “**AN IMPROVED MODE OF MOULDING AND CASTING THE PLATES OR ‘BASES’ OF ARTIFICIAL TEETH,**” upon the condition, amongst others, that I, the said Alfred A. Blandy, by an instrument in writing under my hand and seal, should particularly  
20 describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

**NOW KNOW YE**, that I, the said Alfred A. Blandy, do hereby declare the  
25 nature of my said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement, reference being had to the Drawing hereunto annexed, and to the letters and figures marked thereon (that is to say):—

My Invention consists in four separate and distinct features, all of which  
30 are required to form a perfect denture by the process of casting, as contradistinguished from the process of swaging, altho’ either of these features may be used separately with a beneficial effect upon the old plans or processes. The first of these consists in a peculiar process, by means of which a correct articulation of the teeth can be had, and an absolute fit of the plate to the  
35 mouth obtained. The second consists in so forming the roots, or that part of the tooth intended to be imbedded in the plate, as to adapt it to the process of casting, so that a firm retention of the plate to the tooth is obtained by the simple act of casting the plate. The third consists in the use of a matrix so



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composed of certain ingredients so that when exposed to the action of heat at a given temperature it will neither shrink nor expand, thus removing the possibility of the plate when cast being either too large or too small. And the fourth consists in casting the plates or “bases” of an alloyed metal, which after being cast will not shrink or expand on solidifying or cooling. 5

These I will now proceed to describe in detail and in connexion with each, reference being had to the accompanying Drawing, in which Figures 1 & 2 represent side elevations of a jointed plaster cast, technically termed the “articulator,” the front half of which may be taken to represent the upper and lower jaw during my process preparatory to the adjustment of the teeth 10 thereon.

In Figure 1 the wax rim is represented as being too long in front, and in Figure 2 as properly trimmed; Figure 3 represents a vertical longitudinal section of Figure 2; Figure 4 represents a side elevation of the upper half of the “articulator” after the teeth have been adjusted, and the wax reduced to 15 the proper shape and thickness preparatory to moulding. Figure 5 represents a vertical longitudinal section (through a central incisor tooth) of the moulding flask with the teeth and pattern plate enclosed; and Figure 6, a similar view of the same, but showing the pattern plate removed and prepared for pouring the metal intended to form the “base” or plate. Figure 7 represents a view 20 in perspective of a tooth adapted to the process of casting, and Figures 8 & 9 a plan and section of the same respectively. Figure 10 represents a plan of a block of teeth adapted to my process; and Figure 11, a transverse vertical section of the same, taken centrally through it. Figure 12 represents a view in perspective of an upper sett of teeth completed out of my improved alloy, 25 and by my peculiar process; and Figure 13, a similar view of the same, but represented as being electro-gilded.

An impression of the mouth in wax is first obtained as in other processes, from which a plaster cast is taken, which subsequently forms one-half (A), Figures 5 & 6, of the moulding flask; upon this cast a pattern plate (a) (made 30 of rolled wax, and  $\frac{1}{30}$  to  $\frac{1}{50}$  of an inch thick, and lined on the side next the cast with metallic foil  $\frac{1}{200}$  to  $\frac{1}{300}$  of an inch thick,) is carefully pressed and trimmed to the required shape, after which a rim (b) of wax of about  $\frac{1}{4}$  of an inch wide is placed upon the alveolar ridge of the same. When this is completed the process is repeated for the lower jaw in cases of entire loss of teeth, in which 35 event both plates with their wax rims are then introduced into the mouth and the wax trimmed down until the two rims touch at all points, as shown in Figure 2, due attention being had to the correct closure and proper spacing of the jaws, points essential to the natural appearance of the artificial teeth,



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as also to their comfort and utility. The two plates while thus in the mouth are then so marked upon the wax rims *b* that when withdrawn they may be replaced in precisely the same relation to each other. The double cast, technically termed the “articulator,” Figure 2, is then formed upon them preparatory to the adjustment of the teeth upon the wax rim (*b*,) which adjustment will require the removal more or less completely of said rims, the plates meanwhile being held securely in proper position by the “articulator.” By this process the plate adapts itself with unerring accuracy to the teeth, whereby great expenditure of time, trouble, and patience necessary in the articulation of teeth by other methods are saved where each tooth requires to be ground to fit the plate or base.

The teeth having been arranged, they are for greater security again tried in the mouth, and any slight changes necessary made, after which all superfluous wax is removed, leaving only so much as is designed to be replaced by metal in order to secure a plate of proper thickness for strength and durability and a firm retention of the teeth. The upper pattern plate is represented in section in Figure 5; this, if made rightly at first and carefully handled, will require no further alteration. In this Figure *c* represents the wax added or placed around the teeth, which when replaced by the metal used for the formation of the plate or “base” will secure for them a strong attachment to the plate, and give to teeth thus mounted a superior cleanliness, as it furnishes no crevice or other place for lodgement of extraneous matters. The wax having been properly smoothed, and the slightest change in the position of the teeth carefully avoided, the pattern plate is placed upon the original cast A, Figure 5, and the other half of the matrix made by pouring the composition over it, in doing which care must be taken to fill every crevice between the teeth not occupied by wax. When hardened, the two parts of the matrix are separated and the foil and wax carefully removed, disregarding minute portions of the latter, which the matrix when heated will absorb. A gate (*d*) is then cut (see *d*, Figures 5 & 6,) to give free access to the metal, with suitable vents whenever required for the escape of air or gas during the act of casting, after which the two parts of the matrix are closed and secured firmly together with binding wires (*e*,) and the joint luted with composition similar to the matrix, except on the end containing the gate. The matrix thus prepared is then subjected for two or three hours to a dry heat, ranging from 250° to 350° Fahrenheit, which drives off the moisture (which otherwise would interfere with the flow of the molten metal) and absorbs such particles of wax as may have been too tedious or impossible to remove, and by gradually heating the teeth renders it impossible for the metal to fracture them, as so often happens under other



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processes. The matrix thus heated is then ready to have the metal intended to form the base or plate poured into it, when the sett will be completed, with the exception of the finishing process, which is substantially the same as in the old methods.

For the different varieties of work required the manipulations are substantially the same, and hence do not demand a separate description; but as an absolute & accurate fit to the mouth could not be obtained did the metal used for the purpose of forming the base or the material used in the formation of the matrix shrink or expand in solidifying or cooling.

I will now proceed to describe them, commencing with the matrix, which is composed of nearly equal proportions of plaster of Paris and feldspar. This compound enables the moulds to endure a certain amount of heat without shrinking or breaking, and at the same time sustain and give the exact characteristics of the impressions of the mouth, upon which depends the practical result of the operation, especially when taken in connection with the metal used in forming the plate or base of the teeth, which for the purpose of an accurate fit must not shrink or expand in solidifying on being cast, and yet possess sufficient hardness, strength, rigidity, and durability to render it suitable for the formation of dental plates.

A metal possessing such qualities I form by alloying in certain proportions, according to the strength and rigidity of the plate required, suitable metals, to be herein-after named, in which the expansive property of one or more will counteract the tendency of the others to shrink in cooling after being cast, as, for example, an alloy of this nature may be formed by combining tin, bismuth, antimony, and silver in the following proportions, to wit:—Tin, ten to twenty parts; bismuth, one to five parts; antimony, one to two parts; and silver, one to two parts; to these might be added from five to fifteen parts of cadmium if a still greater strength and rigidity are required, as in cases of partial setts; or, for the same purpose, an alloy composed of tin, twenty to twenty-four parts; antimony, four to six parts; and silver, two to four parts, may be used. In these examples the expansive properties of bismuth and antimony on cooling are used to neutralize the shrinkage on the part of the other metals. These metals (bismuth and antimony) also serve in conjunction with the silver & cadmium to give that hardness, strength, and rigidity to the alloy, which renders it suitable for forming the dental plate, the bismuth also acting in conjunction with the tin and cadmium when used to lower its melting point, great fusibility being an indispensable quality as well in the successful formation of the dental plates by the process of casting, as in the repair of accidents, and in the repair of mistakes. The plates when completed, if



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desired, may be readily and durably coated with pure gold by the process known as electro-gilding; but as a general rule, the plate when made of the above-described alloys will be worn pure, as it is almost devoid of all taste, and is not liable to tarnish or corrode by the secretions of the mouth. From  
5 the foregoing it will be apparent that these alloys may be slightly varied in their relative proportions in order to suit the circumstances of the case, without departing materially from the principle of my Invention, or the metals themselves might be substituted by others possessing the same characteristic properties.

10 The matrix & the metal used for casting the plates, & the process by which an accurate fit to the month and correct articulation of the teeth are obtained, having been described, it is now only necessary to describe the formation of the tooth, by which it is adapted to the process of casting, the object of which is so to encase the teeth with the metal that they shall virtually form but  
15 one piece, thus rendering it utterly impossible for a tooth to work loose or drop out. The teeth employed by me for this purpose are constructed with a channel (*f*) running vertically through them, into which a piece of wire of alloyed tin may be inserted if desired; altho' I frequently omit the use of such, merely permitting the metal of the base to flow in it. When the wire  
20 is used it is allowed to project at either end about  $\frac{1}{16}$  of an inch, which, upon the metal being poured in the matrix to form the plate, secures the positive union or connection of the tooth with the plate. The outer end of this piece of wire may be afterwards fused by means of a blow pipe to make it a headed bolt, so as to rivet each tooth as it were to the plate.

25 In order to effect a more positive union of the teeth with the plate, a neck (*g*) and side projections are formed, which are perfectly encased by the metal, the neck and sides being so shaped as to act as a dovetail, thus rendering it impossible for the tooth to work loose or drop out, unless broken, or the plate by some accident ruptured. Or, the teeth may be formed with a dovetailed  
30 groove extending through the teeth, there being a vertical hole or channel formed in the teeth and connecting with the groove, or a channel may be formed around the exterior periphery of the tooth near its bottom, thus forming a species of a dovetail round which the metal flows, firmly securing the teeth to the plate, as the large end is embedded in it. This process is also adapted  
35 to the securing of block teeth to the plate, which has the effect of rendering them more enduring, and at the same time giving to them a more elegant and finished appearance than by the old processes. For this purpose the upper surface of the block is grooved and perforated (either in part or entirely) through with a series of holes, as shown in Figures 10 & 11, one for every



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tooth, for the reception of a fusible pin, which being melted by the liquid metal as it is poured in the flask ensures a perfect metallic connection between each with the plate. Around the upper edge of the block is accurately cut a narrow curvilinear channel, which forms the limit of the metal, and another bond of connection between it and the plate, there being a similar groove for 5 the same purpose in the rear side of the block. By these grooves the block is firmly secured, that is to say, dovetailed in the metal of the plate, thus rendering it at once strong and neat.

Having thus fully described my Invention, what I claim as new, and desire to secure by Letters Patent, is,—

10

First, moulding the plates or bases of artificial teeth in such a manner as to obtain an accurate fit to the gums and a correct articulation of the teeth.

Second, I claim forming artificial teeth in the manner described so as to adapt them to the process of casting, as set forth.

Third, I claim a matrix composed of plaster of Paris and feldspar in the 15 proportions substantially as specified for the purposes set forth.

And, lastly, I claim casting the plates or “bases” of artificial teeth of an alloy suitable for such a purpose from its chemical & physical properties which practically will not shrink or expand on solidifying or cooling, substantially as set forth.

20

In witness whereof, I, the said Alfred A. Blandy, have hereunto set my hand and seal, this Tenth day of August, A.D. 1857.

ALFRED A. BLANDY. (L.S.)

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LONDON:

Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,  
Printers to the Queen's most Excellent Majesty. 1857.



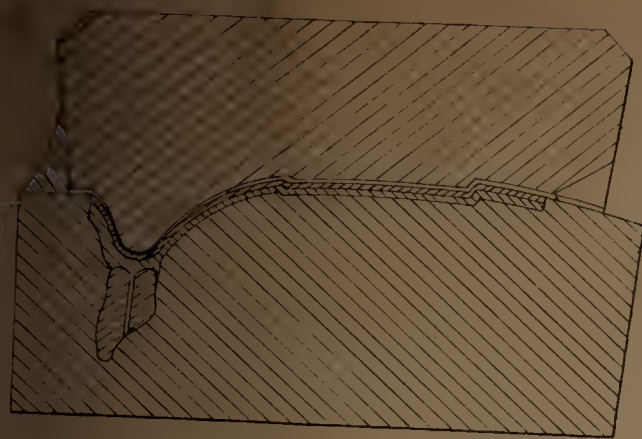


FIG. 5.

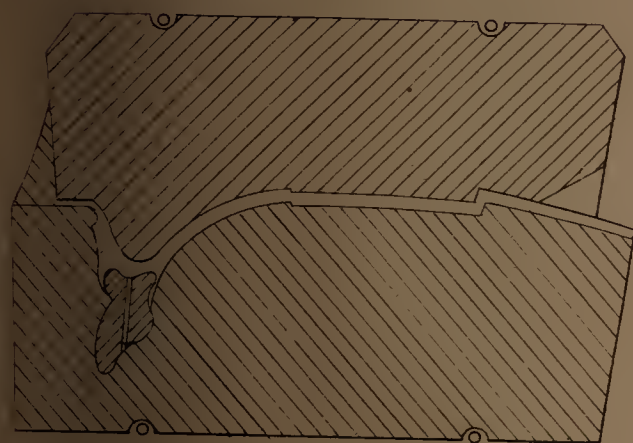


FIG. 6.



FIG. 12.

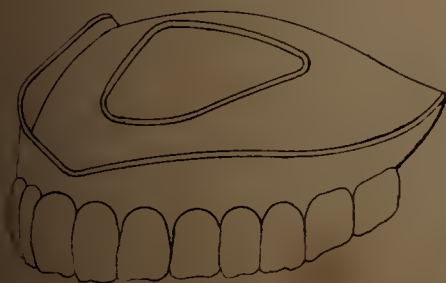


FIG. 13.

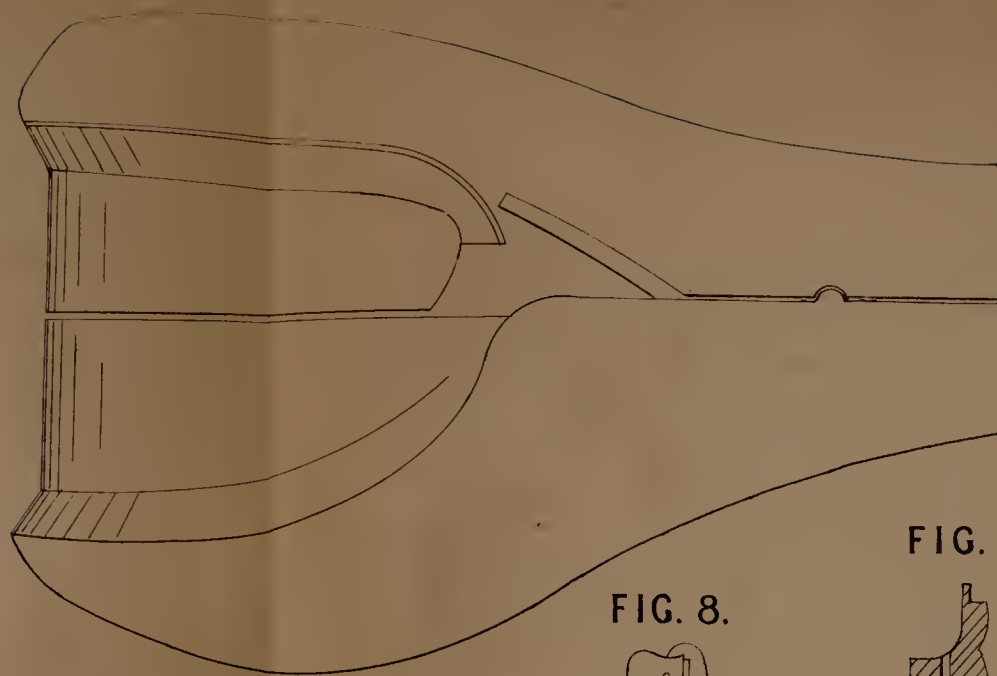


FIG. 1.

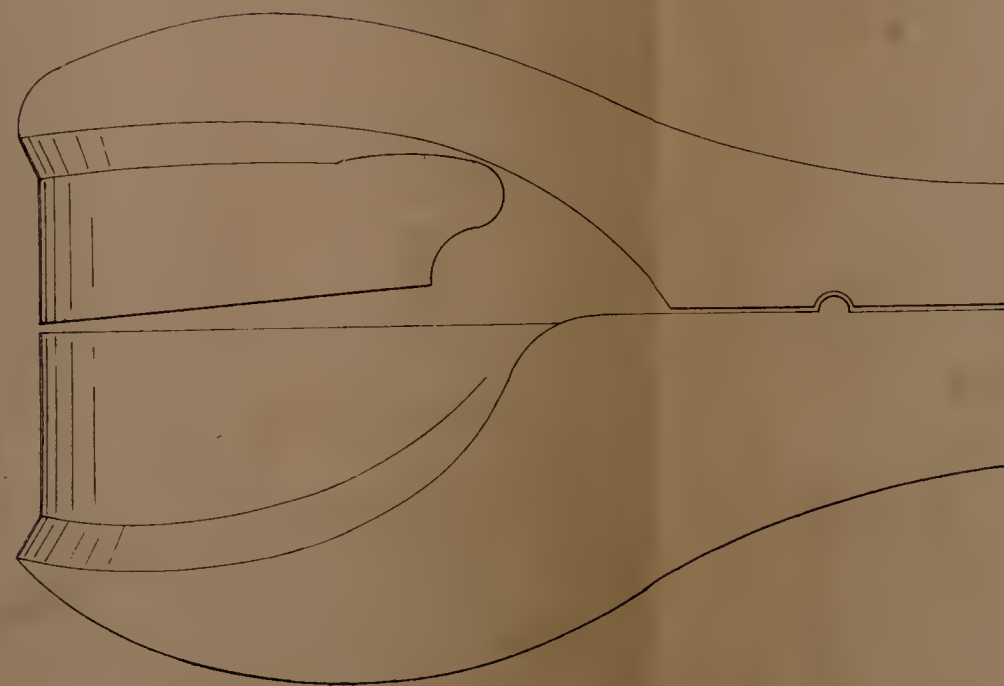


FIG. 2.

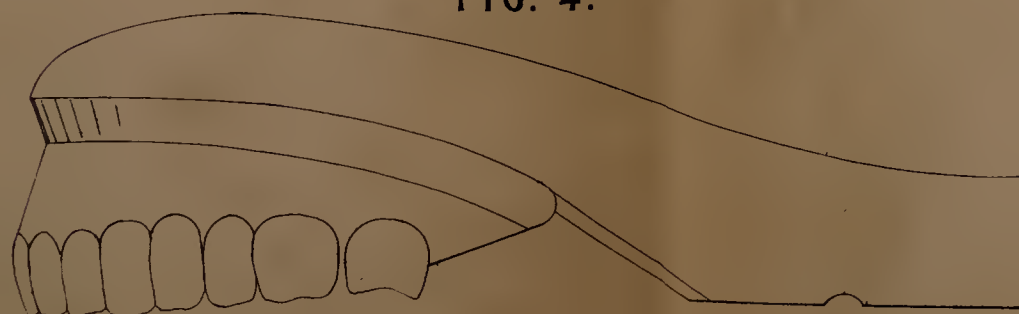


FIG. 4.



FIG. 9.

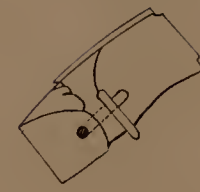


FIG. 7.



FIG. 11.

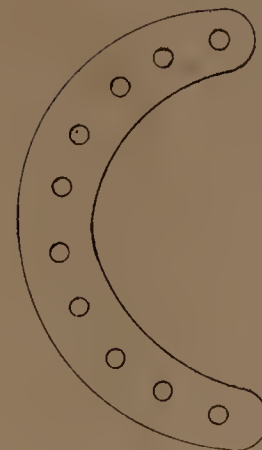


FIG. 10.

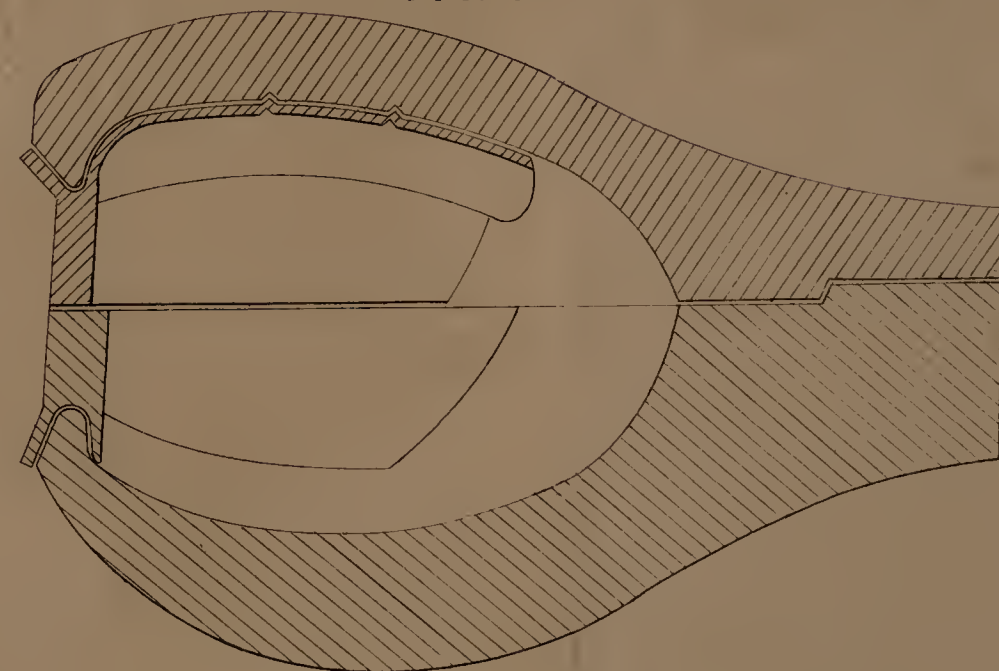


FIG. 3.

*The filed drawing is partly colored.*

Drawn on Stone by Malby & Sons



